ABSTRACT

A scalable video transmission scheme is provided in which client interaction and video content itself are taken into consideration during transmission. In content-based video representation such as MPEG4, incoming video is typically segmented into multiple objects. Each encoded object bitstream includes: control, motion, shape and texture information. Different parts of the information, however, have different priorities within a receiving decoder. For example, shape or motion information is usually more important than texture information. Methods and arrangements are provided to prioritize/classify different types of information according to their importance and to packetized or otherwise arrange the prioritized in a manner that lower priority information may be dropped during transmission should the need arise. Thus, when network congestion occurs or there is not enough network bandwidth to transmit all of the prioritized information about the object, some information, i.e. that with lower priority is dropped at the server or at an intermediate network node to reduce the bit rate. Thus, when the server transmits multiple video objects over a channel of limited bandwidth capacity, the bit rate allocated to each object can be determined according to several factors, such as, e.g., the type/complexity of the video object information, the high-level semantic information of the video object's content and user interactivity behaviors. Additionally, since it can save network bandwidth greatly, multicasting is considered as an effective communication support for multi-party multimedia applications such as distance learning and video broadcasting. However, due to the heterogeneity of the Internet a single sender transmission rate cannot satisfy the different bandwidth requirements at different receiving sides. Therefore, the sender rate is usually adapted to the requirement of

the worst positioned receiver, thereby reducing the quality of the data perceived at all receiving sites. This limitation can be overcome using layered transmission mechanisms. However, in layered approach each layer needs a separate network session, and it is complicated for the network to maintain multiple sessions for each video object and the synchronization control between different layers is difficult to achieve. Furthermore, the transmission rate cannot be adjusted in the granularity smaller than the difference between layers. To solve the above problems, new heterogeneous multicasting methods and arrangements are provided, in which a single layer approach can be employed having the advantages of a layered solution. For example, a Video Transmission Agent (VTA) and a new resource allocation policy (Capacity, Requirement) policy are provided for use within a multicasting arrangement.